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ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

CERN RESEARCH BOARD

**MINUTES OF THE 158th MEETING OF THE RESEARCH BOARD
HELD ON THURSDAY, 11 APRIL 2002**

Present : J-J. Blaising, M. Calvetti, L. Camilleri (Secretary), R. Cashmore,
J.-P. Delahaye, M. Delfino (part time), C. Détraz, H. Flocard, M. Hauschild,
K. Königsmann, P. Lebrun, L. Maiani (Chairman), M. Mangano (replacing
G. Altarelli), J. May, S. Myers, T. Nilsson, W.-D. Schlatter, M. Spiro,
C. Wyss, A. Zalewska.

Apologies: G. Altarelli, L. Evans, H. Hoffmann, G. Roy, J.-A. Rubio.

Items

1. Procedure.
2. Reports and matters arising from the INTC meeting of 25 February 2002.
3. Reports and matters arising from the LHCC meeting of 13-14 March 2002.
4. Reports and matters arising from the SPSC meeting of 26 March 2002.
5. Follow-up on the discussion concerning the proposed savings plan, in particular on its impact on the 2003 Fixed Target programme.
6. Any other business.

1. PROCEDURE

The Director General welcomed M. Mangano replacing G. Altarelli.

The **Minutes** of the Research Board held on 11 March 2002 [1] were not yet available at the time of this meeting and will be discussed at the next Research Board.

2. REPORTS AND MATTERS ARISING FROM THE INTC MEETING OF 25 FEBRUARY 2002.

H. Flocard reported on the 11th meeting of the INTC. He presented the plan submitted by the nTOF collaboration on how to use the 7×10^{18} protons available in 2002. The first item on this plan, the allocation of 1×10^{18} protons to nTOF-02, was recommended for approval by the INTC as it is a prerequisite for establishing the scientific programme of nTOF. The Research Board **concurred** with this recommendation. However the committee could not yet pronounce itself on the rest of the plan. Adequate information on the feasibility of nTOF-03 was not yet available. The two proposals, P142 and a proposal not yet submitted on Th capture and fission, as well as planned fission experiments to run in parallel with the above experiments had not yet been discussed by the INTC. Furthermore nTOF-04 and P145, the recommendation for which was pending because of technical matters, were not included in the planning. The collaboration was therefore asked to rediscuss its strategy at the next INTC.

Claude Détraz informed the Research Board that progress had been made towards nominating a spokesman for each experiment. The MOU is now in its final draft form and should be signed in the coming weeks together with an addendum spelling out the costs (about 25% of the total) to be recovered by CERN on the building of the facility, particularly from EU funds. Money has also been spent by CERN for the experiments and a total of 1.4 MCHF must be recovered. The Research Board **took note** and was encouraged by the progress in establishing nTOF on a sound basis.

Flocard then went on to discuss ISOLDE. He first informed the Research Board that, in spite of the 30% reduction in beam time foreseen this year as part of the savings measures, it was hoped to achieve 350 shifts. This would be done through running one separator while the other one was being equipped with a target (push-pull operation) and by having the experimental teams on-call to profit from fast changes in the schedule. Nonetheless it was pointed out that this would put a heavy load on the operation and that budget restrictions would limit the number of targets that could be prepared. Manpower from the experimental groups was required for the Resonance Ionization Laser Ion Source (RILIS). He also informed the Research Board that the audit on the solid state physics programme at

ISOLDE would be available within days and would be discussed at the next INTC. He then went on to present the experiments recommended for approval by the INTC.

Proposal **P136**, Isospin Symmetry of Transitions probed by Weak and Strong Interactions [2], proposes to test isospin symmetry in the $A=58$ system by comparing G-T transitions measured at Osaka in the reaction $^{58}\text{Ni}(^3\text{He},t)^{58}\text{Cu}$ with the β -decay ^{58}Zn to ^{58}Cu . Following its scientific evaluation in February 2002, positive information on the production of a zinc beam has now been obtained and the experiment is recommended for approval for its requested 25 shifts. The Research Board **concurred** with this recommendation. The new experiment will be known as **IS403**.

Proposal **P148**, Study of the β -decay of ^{12}B [3], proposes to obtain information on the three- α cluster excited spectrum in ^{12}C just above the 7.654 MeV state. A very thin target will allow the observation of the electron and of the three α particles. The experiment is recommended for approval for 15 shifts. The Research Board **concurred** with this recommendation. The new experiment will be known as **IS404**.

Proposal **P149**, Obtaining empirical validation of shape-coexistence in the mass 70 region: Coulomb excitation of a radioactive beam of ^{70}Se [4], intends to determine the sign of the quadrupole deformation in a region of the mass table where theory predicts oblate ground states as well as shape coexistence. The INTC concluded that this experiment could yield direct experimental proof of oblate deformation as opposed to the indirect evidence available so far. In addition it is suitable for REX-ISOLDE and is thus recommended for 15 shifts. The Research Board **concurred** with this recommendation. The new experiment will be known as **IS405**.

Proposal **P150**, Precision Study of the β -decay of ^{62}Ga [5], is designed to explore the properties of a 0^+ to 0^+ transition in a pair of medium mass nuclei with the aim to bring additional information on the V_{ud} matrix element. It is intended to measure both branching ratios and lifetimes. The INTC recommended the experiment for 10 out of the 20 shifts requested with the recommendation that they be used for the branching ratio measurements. The Research Board **concurred** with this recommendation. The new experiment will be known as **IS406**.

Proposal **P151**, Study of the neutron deficient Pb and Bi isotopes by simultaneous atomic and nuclear spectroscopy [6], brings together specialists of both techniques and intends to investigate shape isomerism in mid-shell magic elements. It proposes to measure mean charge radii. Nuclear spin and magnetic moments will also be measured. The proponents offer to provide support for the necessary upgrade of the RILIS control system. The INTC found the scientific case for the measurements on Pb to be sound and less so for Bi. It therefore recommends approval for 15 shifts to be used on Pb isotopes. The Research

Board **concurred** with this recommendation. The new experiment will be known as **IS407**.

Delahaye pointed out the difficulty of the RILIS operation and thanked the management for hiring the best laser specialist available.

Spiro commented on the high rate of acceptance of ISOLDE proposals when compared to that for other machines such as GANIL. In reply it was pointed out that only recommended experiments were discussed at the Research Board and that submitted proposals were pre-filtered by the ISOLDE collaboration. It was also pointed out that the backlog of 1000 shifts existing a couple of years ago was now reduced to 500.

Nilsson reminded the Research Board of the complexity of the push-pull operation which has never been tried for long periods of time.

3. **REPORTS AND MATTERS ARISING FROM THE LHCC MEETING OF 13-14 MARCH 2002**

M. Calvetti reported on the 57th meeting of the LHCC. He first gave the Research Board some news on the performance of Belle and BaBar. They are functioning well and their measurements of $\sin 2\beta$ agree with each other. By LHC turn on it is expected that 540 fb^{-1} will have been collected and that the experimental uncertainty which will have been achieved on V_{cb} will be smaller than the theoretical one and dominated by systematic errors.

A study of the expected trigger rates of ATLAS and CMS has begun and preliminary conclusions are expected in May.

He then presented **RD42**, an effort to develop intrinsically radiation-hard CVD diamond tracking devices. Good progress has been reported in 2001. Diamond crystals are now grown in a similar way to silicon crystals. Collection distances of $270 \mu\text{m}$ have been achieved. It is still not understood why the width of the pulse height distributions and the dark noise decrease with increasing fluence. Their aim to produce pixel diamond detectors and test them with the same electronics and under the same conditions as corresponding silicon devices has not been realized yet. Given the modest requirements of this group and the potential radiation-hard devices that could emerge from this technology, the LHCC recommended continuation of this R&D in 2002 with the aim of producing pixel diamond detectors and of performing the comparison with silicon detectors. The Research Board **concurred** with this recommendation.

Calvetti reported on CMS having to reduce the number of optical links on their ECAL, going from one fibre per crystal to one per 25 crystals for reasons of cost reduction. On-detector L1 ASICS will be incorporated. The new system must be designed in a very short

time as it has to be available at the end of 2003 in order to begin the test beam calibration of the ECAL. The LHCC has requested written documentation on these changes.

He also presented the LHCb Online system TDR [7], describing the Data Acquisition and Experiment Control systems. Because of the built-in locality of the functionality it allows the separation of the detector into “sub-detectors” in which different tasks can run (calibration, data acquisition,...). The system is realizable even today. It is intended to start commissioning in 2005 although components will be purchased as late as possible to profit from falling costs of computer components. The systems proposed are suitable for accumulating and storing data at the rates expected to prevail in LHCb and for controlling and monitoring the detector. The Research Board **approved** the submitted TDR, under the LHCC formulation, which allows the Committee to monitor further progress of this project through the implementation of schedules and milestones listed in the ancillary document.

Calvetti then summarised the second ALICE Comprehensive Review [8]. The collaboration is still growing, having now reached 1000 physicists. Concern was expressed by the LHCC over the cost increases in the muon absorber and in the delay resulting from its redesign. Bump bonding for the pixel detectors has been successful but, since ALICE intend to include information from these detectors in their trigger, a modification of the read out chip will be necessary in order to include a fast OR. This can be done at a modest cost but will imply a 6-9 month delay. The zero-suppression chip for the TPC is already available. It has been decided to locate the HMPID on the side rather than on top of the detector. The TOF multigap RPC system has been shown to yield a 53 psec resolution with an efficiency close to 100%. The cost and feasibility of its read out still need to be addressed and the addendum to the TOF TDR will be reviewed in the coming months. The muon chambers are under construction. The PHOS crystals will be similar to those of CMS and will also be read out with avalanche photodiodes. The main concern on the PHOS is the level of available funding. The LHCC is expecting TDR's on the trigger and DAQ. The computing load of ALICE is similar to those of ATLAS and CMS. They are participating in GRID development and their data challenge is progressing well.

The main message is that things are going well and that ALICE has addressed the concerns expressed at the time of the first Comprehensive Review. The experiment is looking for new collaborators and, if found, this could solve some funding problems.

The Research Board **took note** with satisfaction of the progress of ALICE.

In reply to a question by Zalewska, the Research Board was informed that the problem of the firm asking for more money in order to integrate the ATLAS magnet coils is being solved by doing the work at CERN with the help of Saclay and Dubna

4. **REPORTS AND MATTERS ARISING FROM THE SPSC MEETING OF 26 MARCH 2002**

K. Königsmann presented the status of several PS and SPS experiments discussed at the 57th meeting of the SPSC.

ASACUSA (AD3) has installed and used an RFQD and a trap. They have already published several results. The collaboration has been very successful and active. The SPSC has congratulated them and has asked them to submit by the end of 2002 a detailed addendum to their proposal outlining their long-term physics programme. The Research Board **took note** with satisfaction of the progress of this experiment.

HARP (PS214) submitted a status report [9] to the SPSC. The experiment was designed and installed in just 17 months. Data taking was delayed because of a leak in a Cerenkov counter and of soldering problems in the TPC readout. Data samples have been collected at 35 settings, amounting to about one third of the projected programme. However the data has been affected by some instability in the trigger downscaling, by noise in some TPC channels which reduced the trigger rate (fixed during the run) and by cross talk in about half of the TPC channels. In addition half of the triggers were due to non-interacting particles. The plans of the Collaboration for 2002 are to improve the selectivity and rate of the trigger, to complete the solid target programme, including K2K and MiniBooNE targets and to use cryogenic targets. No physics results were presented in their status report and it is therefore hard to judge the quality of the data. Therefore, the SPSC has asked them to submit a progress report on the data quality by their May meeting and to ascertain the good quality of their data in 2002. A panel of three referees, including a TPC expert, has been appointed to scrutinize the experiment and to ensure that they can achieve their goal this year. In the ensuing discussion Détraz informed the Research Board that whereas the experiment, as a whole, was built within the foreseen financial envelope, CERN has spent, for its part, considerably more than anticipated and has asked for the reimbursement of its over expenditure. It is also difficult to find the necessary funds within EP for the operation of HARP. Delfino pointed out the heavy computing load of this experiment arising from the fact that all events are useful. Originally it had been anticipated that HARP would be a short time scale experiment and the technological solution suggested to them was based on an LHC option which has since been discarded. Their request that accessibility to the data should now be ensured for five years may entail switching to a

different technology. The Research Board **took note** of the above and stressed that the experiment **cannot run beyond 2002**.

CERES (NA45) was congratulated by the SPSC for the good quality of their data and for their impressive results on low mass electron pairs. However the SPSC confirmed its previous decision not to approve this experiment for further running. The Research Board **concurred** with this decision.

NA49 searches for the onset of deconfinement. In particular they study pion and strangeness production which have exhibited changes in behaviour around 40 A GeV. They have therefore already been approved for 20 and 30 A GeV heavy ion runs. They are now asking to participate in the 160 A GeV run in order to study the production of antibaryons by neutrons, the neutrons being part of deuterons produced in Pb + C reactions. They point out that a detailed understanding of p + p and n + p reactions is needed in order to understand possible signatures of the QGP. They also request an extension of the proton runs to the maximum possible 23 days in order to measure Ω production. The SPSC recommends approval of the 23 days of proton running in 2002 and strongly recommends the deuteron running. Since Pb-Pb results are always compared to p-Pb reactions, both of which already involve neutron reactions, it was not clear to the Research Board what would be learnt through these additional neutron studies. In view of the tight financial situation, the Research Board **requested** that detailed manpower and financial implications of the additional proton run and of the participation in the high energy heavy ion run should be made available at the next Research Board in order for a decision to be made.

NA57 has observed an enhancement in strange particle production similar to the one noted by WA97. Half of the differences in rate between the two experiments have now been understood. The SPSC looks forward to the final results on strange particle production from the 40 A GeV and 160 A GeV and defers the decision on the request of NA57 to participate in the Indium run in 2003 until later this year. The Research Board **took note**.

NA60 made considerable progress since the last report. However the SPSC is concerned by the very tight financial and manpower situation. A pixel prototype plane is expected to be available in April after which mass production will start. Any further delay would compromise the availability of the full pixel telescope for the heavy ion run. It was stressed that this run would be of little value without the pixels. The SPSC therefore encouraged the collaboration to freeze the hybrid design soon and urged CERN to lend its full support to this experiment. It also requested the Collaboration to submit a status report at its next meeting. Schlatter pointed out that, concerning the pixels, help to NA60 must come from

ALICE but that this experiment has its own, different, schedule. The Research Board took note.

5. FOLLOW-UP ON THE DISCUSSION CONCERNING THE PROPOSED SAVINGS PLAN, IN PARTICULAR ON ITS IMPACT ON THE 2003 FIXED TARGET PROGRAMME

The Director General summarized his presentation to the SPC on March 19th 2002. This presentation followed the same lines as the one he made to the previous Research Board and described in the written report to the SPC and FC [10], also distributed to the members of the Research Board at its previous meeting. The main lines are:

- a) last LHC dipole delivered in July 2006,
- b) first beam in LHC in April 2007,
- c) no additional delay to ALICE and LHCb,
- d) a reduction of accelerator R&D, focusing it on CTF3 and SPL (120 MeV),
- e) a shutdown of the SPS in 2005,
- f) a reduction of the PS and SPS beam time by 30% in 2002, 2003, 2004 (possibly) and 2006,
- g) a withdrawal of CERN from OPERA,
- h) a request to the CNGS project team to present a revised version staying within the original cost estimate,
- i) a reduction of the Fellows and Associates budget by 15-20% possibly compensated partially from other sources.

Savings from this redefined scientific programme, together with savings from a reorganization of industrial services, would reduce CERN expenditures by 329 MCHF thus allowing reallocation of these resources to the LHC. Debt repayment would be extended until 2010. Plans to restructure the accelerator sector into two divisions are also being formulated.

A more detailed plan is currently being worked on and will be presented to the SPC in May. In reply to a question by Blaising, the Director General informed the Research Board that the SPC, after an in-depth discussion, supported the plan presented to it. At the CC complaints were made about the termination of the Heavy Ion programme and the reduction of accelerator R&D.

Königsmann suggested that some countries would be willing to provide extra funds provided they were earmarked for accelerator R&D.

Spiro inquired about some suggestions he had heard of extending the SPS stop to 2006 as well. He was informed that this was brought up by the ERC but that this would severely jeopardize remaining calibration activities for LHC detectors and delay even further the start up of the CNGS programme. Myers added that this would also imply starting up both SPS and LHC at the same time.

In reply to Blaising, the Director General mentioned that, following the decision to withdraw the CERN participation to OPERA, he had had no indications of additional financial support that would allow him to reverse this decision. Spiro noted that the use of SPL would increase the neutrino flux to OPERA and ICARUS. It was agreed that an optimization of neutrino intensity and detector mass was needed.

Zalewska inquired about the possibility of reconsidering the funds available for accelerator R&D. The Director General pointed out that this activity was not abandoned altogether, but that resources were being concentrated on activities not being pursued elsewhere, namely CTF3 in view of multi-TeV linear colliders. SPL was also going on.

The Director General mentioned that the savings arising from the interest-free loan of 90 MCHF granted by the Swiss Confederation are presently estimated at a level of 20 MCHF. It was too early to decide how this money would be used, but the need for some margin was clearly stated.

The Research Board **encouraged** the formation of networks of laboratories involved in specific areas of accelerator R&D, such as CTF3 and SPL, in order to use the resources available in the best possible way.

In conclusion, the Research Board, given the present circumstances, **supported** the plan presented by the Director General.

6. ANY OTHER BUSINESS

The next meeting of the Research Board will take place on

Thursday 30 May 2002.

ENCLOSURES

- [1] Minutes of the 11th INTC meeting held on 25 February 2002 (INTC 2002-010/INTC11)
- [2] Minutes of the 57th LHCC meeting held on 13-14 March 2002 (LHCC 2002-013/LHCC 57)
- [3] Minutes of the 57th SPSC meeting held on 26 March 2002 (SPSC 2002-015/SPSC 57)
- [4] Transparencies presented by the Director General at the 19th March 2002 meeting of the SPC on the CERN draft plan to LHC completion: Scientific activities and savings.

REFERENCES

- [1] Minutes of the 157th meeting of the Research Board held on 11 March 2002 (CERN/DG/RB 2001-332, M157)
- [2] Isospin symmetry of transitions probed by weak and strong interactions (INTC 2001-008/P136; 2002-001/P136 Add. 1)
- [3] Study of the β -decay of ^{12}B (INTC 2002-002/P148)
- [4] Obtaining empirical validation of shape-coexistence in the mass 70 region: Coulomb excitation of a radioactive beam of ^{70}Se (INTC 2002-003/P149)
- [5] Precision Study of the β -decay of ^{62}Ga (INTC 2002-004/P150)
- [6] Study of the neutron deficient Pb and Bi isotopes by simultaneous atomic- and nuclear-spectroscopy; (INTC 2002-005/P151)
- [7] LHCb Online System Technical Design Report (LHCC 2001-040, LHCb TDR 7)
- [8] ALICE Comprehensive Review (LHCC 2002-12/G004)
- [9] Status report of the HARP experiment (SPSC 2002-013/M681)
- [10] The Scientific Activities of CERN and Budget Estimates for the Years 2003-2010 (CERN/SPC/806 and CERN/FC/4537)